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ABSTRACT

The effects of distributed study, self-pacing, a criterion of mastery, and individualized testing were examined by assigning 422 students in an introductory psychology course to one of four different teaching/learning systems. The first encompassed a traditional lecture/discussion group format. The second employed the personalized system of instruction (PSI) method, consisting of programmed instructional materials, individualized unit-testing and a criterion of mastery. The third required the student to write a weekly test covering the assigned chapter in the text; students were tested in groups and there was no criterion of mastery. The fourth group wrote weekly tests with a mastery criterion. They received credit only if they passed the unit tests on one of three trials. The means of the scores on a common final exam differed significantly for all four groups. The PSI group achieved the highest mean scores, followed by the weekly testing groups, with and without mastery. The group exposed to the traditional lecture/seminar format had the lowest mean score. Six references and one table are included. (Author/CHC)

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PSI -- WHAT ARE THE CRITICAL ELEMENTS?

by

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PSI -- What are the critical elements?[1,2]

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ABSTRACT

Students in an introductory psychology course were assigned to one of four different teaching/learning systems. The first encompassed a traditional lecture/discussion group format. The second employed the PSI method, consisting of programmed instructional materials, individualized unit-testing and a criterion of mastery. The third required the student to write a weekly test covering the assigned chapter in the text. Students were tested in groups and there was no criterion of mastery. The fourth group wrote weekly tests with a mastery criterion. They received credit only if they passed the unit tests on one of three trials.

The means of the scores on a common final examination differed significantly for all four groups. The PSI group achieved the highest mean scores, followed by the weekly testing groups, with and without mastery. The group exposed to the traditional lecture/seminar format had the lowest mean score.

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[1] Presented at the meetings of the American Psychological Assn., Los Angeles, Ca. Aug. 24-28, 1981.

[2] We wish to express our thanks to Robert M. Callaghan for his help in collecting and analyzing the data.

Studies comparing student performance in courses using personalized systems of instruction (PSI) with traditional teaching/learning systems show a consistent difference in grades in favor of PSI. What is less clear, however, is which of the various components of PSI singly, or in concert, contribute to this difference. Keller (1968) listed the following attributes of PSI: 1) each student proceeds at his/her own pace, 2) mastery is required before the student can move on to new material, 3) the system stresses written communication between the student and the teacher, 4) the employment of proctors permits repeated testing, immediate feedback, inevitable tutoring and "an enhancement of the personal-social aspect of the educational process," and 5) lectures and demonstrations can be designed to motivate the student.

The question is, are all of these ingredients equally necessary for improving student performance or are some more important than others? Breland and Smith (1975) found that students in a psychology course who were not exposed to any classroom experiences suffered no decrement in their performance, nor did they show a marked change in their attitude toward psychology. Roll and Pagen (1977) showed that human proctors were not necessary. In fact computers, which gave immediate feedback and references to the text for further study, were more effective.

There is conflicting evidence on the remaining components of PSI, i.e. the role of self-pacing, individualized testing and mastery. Goldwater and Acker (1975) reported that the critical ingredient of PSI is distributed practice rather than self-pacing or individualized testing. But Caldwell et al. (1978) insist that the concept of mastery is crucial, because students will generally perform at the level expected of them .

The present study employed four different teaching/learning formats in order to examine the effects of distributed study, self-pacing, mastery and individualized testing.

The study was carried out over two semesters. All sections of a large introductory psychology course were taught by the same instructor. One section received two lectures per week, supplemented by weekly discussion groups led by graduate teaching assistants (GTA's). Paralleling this section there were three others. One of these also received two lectures per week, but instead of the discussion groups, they participated in a self-study program consisting of a programmed study manual which accompanied the text and a locally produced course guide. Regular testing sessions were held throughout the week. Students were told that they could take the unit tests whenever they were ready, but that they would have to score eighty percent or better in order to pass. For each unit the student was given a maximum of three tries to reach this criterion. Tests were scored individually by proctors (GTA's), who gave the students feedback about specific deficiencies, directing them to the relevant sections of the text and study materials, (directed feedback).

Students in another section participated in a modified self-study program. Here the only resource was the textbook and the two weekly lectures. Students were required to write weekly quizzes covering the material assigned for that week. They were allowed only one try for each unit-test and their grades were based on the number of items passed. Thus distributed study (without self-pacing) was imposed, but there was no requirement for mastery (external pacing).

Finally, there was a section which employed weekly testing (external

pacing) but also required mastery. Students were told that they would have to pass the weekly unit-tests at eighty percent or better, on one of three trials.

There were a number of common elements for all of the sections. Students were assigned by the University's registrar to the particular section which best fitted the rest of their schedule. (Although students were permitted to transfer from one section to another during the first two weeks of the semester, few chose to do so solely on the basis of course format.)

All sections used the same textbook (Wrightsman et al. 1978). The final examination in the course was written by all students at the same time; eighty percent of the items on this test were common for all sections. These common items, rather than over-all course grades, served as measure of the differences in the performance resulting from the four teaching/learning formats.

Insert Table 1 about here

The data show the superiority of performance for the students in the self-paced, unit-mastery system over all other systems of instructions. However external pacing with a criterion for mastery also produces significantly better performance than external pacing without a mastery criterion or the traditional lecture/seminar method which, as expected, resulted in the lowest grade averages.

The superior performance of the students in the self-paced, unit-mastery system could have resulted from one or all of the following components. Although both systems had a mastery requirement, one was self-paced while

the other was externally paced. The self-paced group was also required to work through the programmed material and received immediate, directed feedback on their test performance.

Based on these data we conclude that self-pacing, external pacing, mastery criteria, programmed material and directed feedback singly or in combination, can serve to enhance performance over the traditional lecture/seminar method. In fact, when they are combined in the manner described in this study they are additive, each contributing to a significant improvement in performance. Putting it more succinctly, any one of these systems results in better performance than the traditional lecture/seminar method.

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TABLE 1

FINAL EXAM RESULTS OF FOUR SYSTEMS OF INSTRUCTION

	N=	X	SE
SELF-PACED MODULES	92	77.84	1.29
WEEKLY TESTING (WITH MASTERY)	117	73.46	1.25
WEEKLY TESTING (WITHOUT MASTERY)	65	68.84	1.36
LECTURE/SEMINAR	148	65.21	1.20

(ALL DIFFERENCES WERE SIGNIFICANT AT THE .05 LEVEL)